

Appl. No. 09/605,227
Amdt. Dated November 10, 2003
Reply to Final Office Action of August 12, 2003

Attorney Docket No. 81870.0009
Customer No. 26021

REMARKS/ARGUMENTS:

Claims 1, 5, and 7 are amended. Support for the amendments to claims 1, 5, and 7 can be found on p. 17, lines 5-8 of the Applicant's specification. Claims 1-29 are pending in the application. No new matter is added. Reexamination and reconsideration of the application, as amended, are respectfully requested.

The present invention relates to an optical module and a connecting structure for an optical module which are used mainly in optical communication equipment or the like. (Applicant's specification, at p. 1, lines 1-4). The optical modules and connection structures of the present invention enable secure and easy mounting on an electric circuit board and are highly reliable. (Applicant's specification, at p. 4, lines 22-25).

Applicant believes the following amendments comply with requirements of form and thus may be admitted under 37 C.F.R. § 1.116(a). Alternatively, if these amendments are deemed to touch the merits, admission is requested under 37 C.F.R. § 1.116(b). In this connection, these amendments were not earlier presented because they are in response to the matters pointed out for the first time in the Final Office Action.

Lastly, admission is requested under 37 C.F.R. § 1.116(a) as presenting rejected claims in better form for consideration on appeal.

CLAIM REJECTIONS UNDER 35 U.S.C. § 103:

Claims 1-29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Beckwith (U.S. Patent No. 5,615,292) in view of Carney (U.S. Patent No. 4,466,696). Applicant respectfully traverses these rejections. Claim 1, as amended, is as follows:

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An optical module comprising:
a substrate having a planar main surface and a groove in the main surface of the substrate;
an electric connection terminal provided on the substrate;
an optical element completely provided on the planar main surface of the substrate, the optical element being connected with the electric connection terminal,
wherein the optical element is mounted on the planar main surface of the substrate; and
one end of a slender light transmitter fixed in the groove and optically coupled with the optical element,
wherein the light transmitter immediately adjacent to the optical element is fixed in the groove.

Applicant respectfully submits that the combination of Beckwith and Carney cannot render amended claim 1 obvious because the combination of references fails to teach or suggest an optical element that is mounted on the planar main surface of a substrate and optically coupled to an immediately adjacent light transmitter that is fixed in a groove. The Office states, "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Beckwith device to use a substrate having a groove and an optical fiber fixed in the groove." The Office relies on Carney for teaching "the use of optical packaging substrates with v-grooves for mating optical fibers with optical transceiver devices, wherein the optical transceiver device is completely provided on the main surface of the substrate, and the optical fiber, especially the portion immediately adjacent to the device, is fixed in the groove."

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In response, the Applicant respectfully submits that there is no motivation or suggestion to combine the teaching of Beckwith with the teaching of Carney. In Carney, a V-groove is etched into the same semiconductor substrate 10 onto which the epitaxial layers for the laser have been grown. Because the V-groove is etched into the same material in which the laser or LED is fabricated, the critical alignment is done during a photolithographic process which has a resolution of one micrometer or less. There is never a problem of adjusting the position of the fiber with respect to the emitting region because the dimensions and position of the groove automatically position the fiber. (Carney, column 3, lines 8-17). Thus, in Carney, the accurate alignment is obtained because the V-groove is etched into the same material in which the epitaxial layers for the laser (optical element) have been grown. Beckwith, in contrast, teaches optical elements that are mounted not grown. (Beckwith, Figure 4b, column 3, lines 9-20). Consequently, the benefit of the V-groove as taught by Carney could not be obtained in Beckwith. Therefore, a person of ordinary skill in the art would not be motivated to combine the two teachings.

In light of the foregoing, Applicant respectfully submits that Beckwith and Carney could not have made amended claim 1 obvious, because the combination of references do not teach or suggest each and every claim limitation. Claims 2-4 depend from claim 1 and cannot be made obvious for at least the same reasons as claim 1. Withdrawal of these rejections is thus respectfully requested.

Claim 5, as amended, is identical to claim 1 except that the optical element is defined to be a planer lightwave circuit. Therefore, claim 5 cannot be made for obvious for the same reasons as discussed above. Claim 6 depends from claim 5 and therefore, cannot be made obvious for at least the same reasons as claim 5. Withdrawal of these rejections is thus respectfully requested.

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Claim 7, as amended, although not depending from claim 1, has all the limitations of amended claim 1, and therefore cannot be made obvious for at least the same reasons as claim 1. Withdrawal of this rejection is thus respectfully requested.

Claims 8-17 depend from claim 7, and as such include all the limitations of amended claim 7, and therefore cannot be made obvious for at least the same reasons as claim 7. Withdrawal of these rejections is thus respectfully requested.

Claim 18 is as follows:

An optical module comprising:

a package casing provided with an electric terminal on a surface thereof, the package casing having a mount space;

a substrate bearing an optical element, an electrode drawn from the optical element, and one end of a slender light transmitter, the optical element and the one end of the slender light transmitter being fixedly attached on the substrate and optically coupled with each other, the substrate being placed in the mount space of the package casing; and

a bonding member which connects the electric terminal of the package casing and the electrode pad on the substrate.

Applicant respectfully submits that the combination of Beckwith and Carney cannot render claim 18 obvious because the combination of references fails to teach or suggest "a package casing provided with an electric terminal on a surface thereof." In Beckwith, fiber optic cables 4 are retained in openings 20 and 21 of the body 2, while a light sender 9 and a light receiver 10 are mounted on a printed circuit board 12 mounted on a printed circuit board 13. (Beckwith, column 2, line 58-column 3, line 21; Figure 4b). Thus, it is difficult to accurately determine the positions of the light sender and receiver relative to the ends of the fiber cables 4.

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In contrast, according to the present invention claimed by claim 18, a substrate bears an optical element and one end of a slender light transmitter, and the optical element and one end of the slender light transmitter are fixedly attached on the substrate and optically coupled with each other. Carney cannot remedy the defect of Beckwith and is not relied upon by the Office for such. Instead, as discussed above, the Office cites Carney for disclosing the use of optical packaging substrates with v-grooves.

In light of the foregoing, Applicant respectfully submits that Beckwith and Carney could not have made claim 18 obvious, because the combination of references do not teach or suggest each and every claim limitation. Claims 19-21 depend from claim 18 and cannot be made obvious for at least the same reasons as claim 18. Withdrawal of these rejections is thus respectfully requested.

Claim 22, similar to claim 18, requires the limitation that the package casing be provided with an electric terminal on a surface thereof. Therefore, claim 18 cannot be made for obvious for the same reasons as discussed above. Claim 23 depends from claim 22 and therefore, cannot be made obvious for at least the same reasons as claim 22. Withdrawal of these rejections is thus respectfully requested.

Claim 24, although not depending from claim 18, has all the limitations of amended claim 18, and therefore cannot be made obvious for at least the same reasons as claim 18. Withdrawal of this rejection is thus respectfully requested.

Claims 25-29 depend from claim 24, and as such include all the limitations of claim 24, and therefore cannot be made obvious for at least the same reasons as claim 24. Withdrawal of these rejections is thus respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

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If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6810 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

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By: Barry M. Shuman
Barry M. Shuman
Registration No. 50,220

500 South Grand Avenue, Suite 1900
Los Angeles, California 90071
Phone: 213-337-6700
Fax: 213-337-6701